

***Parabuccinum*, a new genus of Magellanic buccinulid
(Gastropoda: Neogastropoda), with a description of a new species**

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Abstract.—A new genus, *Parabuccinum*, is established for four bathyal Magellanic species, of which one, *Parabuccinum rauscherti*, is described as new. The remaining three species were originally described in the Antarctic genus *Chlanidota*, from which they differ in the morphology of their protoconch, operculum, radula, stomach, and male reproductive system. *Parabuccinum* appears to be most closely related to the monotypic circumAntarctic genus *Neobuccinum*, but may be distinguished on the basis of shell and penis morphology, as well as by the size and shape of the gland of Leiblein. *Parabuccinum* is endemic to the Magellanic Province, and is the first record of the subfamily Buccinulinae in the malacofauna of this region.

The genus *Chlanidota* Martens, 1878 had been considered to be one of the more diverse and wide-ranging members of the antitropical buccinoidean radiation. Dell (1990) included 13 species within this genus, some tentatively, among them four species that he described as new. A more recent revision (Harasewych & Kantor, 1999) divided the genus *Chlanidota* into two subgenera, *Chlanidota sensu stricto*, with five species, and *Chlanidota (Pfefferia)* containing three species. Five species were excluded from *Chlanidota* on the basis of newly obtained anatomical data as well as radular and opercular morphology.

Three of the species described by Dell (1990) (i.e., *Chlanidota biscalpta*, *C. eltanini*, and *C. polyspeira*), all from the Magellanic Province, differ substantially from all species of *Chlanidota*. In this publication, we propose a new genus to include these species, as well as an additional species more recently collected by R/V *Polarstern* and R/V *Vidal Gomaz* and described herein.

A review of each of the species included in this new genus is provided.

Materials and Methods

This report is based primarily on material collected by the United States Antarctic Program (USAP), housed at the National Museum of Natural History, Smithsonian Institution (USNM), and consisting mostly of the type material for the three species described by Dell (1990). Additional samples, including alcohol preserved anatomical material, were collected at two stations of the R/V *Polarstern* and one station of the R/V *Vidal Gomaz*. These samples are maintained in the collections of the Zoologisches Institut und Zoologisches Museum der Universität Hamburg (ZMH).

In the material examined sections, “specimen” denotes live collected material, while “shell” refers to records containing only the dead collected shells.

Shell and operculum measurements were obtained for representative specimens of

each species ($n = 10$, when available), as detailed in Harasewych & Kantor (1999: fig. 1). Anatomical descriptions are based on gross dissections of preserved material. Radulae were removed by dissection, cleaned using diluted bleach (NaClO), coated with carbon and gold, and examined using a Hitachi S570 Scanning Electron Microscope (SEM).

Photographs were obtained using a Leaf Lumina Digital Scanning Camera. Optical and SEM images were processed using Photoshop Version 5.02 (Adobe).

The following abbreviations are used in the text: SL—shell length, AL—aperture length, BWL—body whorl length, SW—shell width.

Systematics

Order Neogastropoda Wenz, 1938

Superfamily Buccinoidea Rafinesque,
1815

Harasewych & Kantor (1999:256) provided a brief overview of the current state of buccinoidean systematics and summarized several of the more prevalent classifications. Until the phylogenetic relationships of the higher taxa of Buccinoidea are reassessed on a global scale, we provisionally continue to use the family Buccinulidae and its subdivisions, as defined by Powell (1951), to include the many distinctive austral buccinoidean taxa.

Family Buccinulidae Finlay, 1928

According to Powell's (1951:151) concept of Buccinulidae, the chief characteristics of the group are tricuspid rachidian teeth and an operculum with a terminal or subterminal nucleus. In our ongoing studies on Buccinoidea, we were able to identify several anatomical characters, among them the prevalence of fused salivary glands, and a simple stomach that lacks a posterior mixing area, that will likely serve to distinguish Buccinulidae from Buccinidae and other buccinoidean families.

Subfamily Buccinulinae Finlay, 1928

Powell (1951) subdivided the family into three subfamilies, the Cominellinae, Buccinulinae and Prosiphiinae based on the morphology of the lateral teeth of the radula. Cominellinae were characterized as having bicuspid lateral teeth, Buccinulinae were diagnosed by their tricuspid lateral teeth, while Prosiphiinae were recognized by their lateral teeth with a long basal projection. However, taxa included in Prosiphiinae vary considerably in their radular morphology, suggesting that resolution on a fine scale may be possible within this group.

The radular teeth of the four species included in the new genus *Parabuccinum* all have tricuspid lateral teeth, indicating that this genus is referable to the subfamily Buccinulinae.

The geographic range of the subfamily Buccinulinae spans Australia, New Zealand, Antarctica, and the eastern Pacific coast as far north as California (based on Powell's (1951) inclusion of the genus *Kelletia* in Buccinulidae). *Parabuccinum* extends that range into the Magellanic Province.

Genus *Parabuccinum*, new genus

Type species.—*Chlanidota biscalpta* Dell, 1990.

Description.—Shell small for family, reaching 10.2–16.4 mm, depending on species. Shell relatively thick, solid, elongate or elongate-ovate in outline, spire high (about 0.33 to 0.5 SL). Spiral sculpture of thin to prominent low cords. Axial sculpture ranges from fine growth lines to prominent, sigmoidal, weakly prosocline ribs, depending on species. Aperture narrowly oval. Siphonal notch broad, slightly recurved dorsally, abaxial margin may form ridge along fasciole. Periostracum thin, smooth or finely hirsute, covering most of shell. Operculum large (0.53–0.60 AL), ovate, paucispiral, with nucleus rotated clockwise, nearly 180° along long axis of

operculum. Proboscis of moderate length. Radular ribbon long, triserial. Rachidian tooth with 3 large cusps (central cusp largest) emerging from shallowly arched, straight-sided basal plate. Lateral teeth with 3 cusps, outer cusp longest, middle cusp shortest, closely adjacent to innermost cusp. Salivary glands small, fused. Valve of Leiblein well defined. Gland of Leiblein very small, tubular. Stomach broadly U-shaped, without caecum. Penis long, with flattened distal surface, bordered by thickened edge. Papilla long, cylindrical, situated in middle of distal surface, surrounded by very narrow circular fold at its base.

Remarks.—Conchologically, species of *Parabuccinum* somewhat resemble juvenile specimens of *Chlanidota*, but differ in having shells that are more slender and have a large, invariably well preserved protoconch, a relatively tall spire, and a very thin periostracum. In contrast, the protoconch of *Chlanidota* remains unknown, despite the large number of specimens (including juveniles <10 mm SL) that were studied (Harasewych & Kantor, 1999). Anatomically, *Parabuccinum* differs from *Chlanidota* in having a proportionally larger, paucispiral operculum, a very long and thin-walled siphon, a very small gland of Leiblein, a penis with a flattened distal surface with a thickened edge, and a stomach that overlies a portion of the esophagus.

There are some conchological similarities between this new genus and *Buccinella jucunda* (Thiele, 1912), which differs in having a prosiphiine radula (Thiele 1912: pl. 16, fig. 13) and an operculum with a terminal nucleus (pl. 13, fig. 20). *Parabuccinum*, especially *P. eltanini*, also resembles *Neobuccinum eatoni* (Smith, 1875) in general shell outline, operculum and protoconch morphology.

Parabuccinum is endemic to the Magellanic Province, and has a bathymetric range of 247 to 2165 m.

Parabuccinum bisculptum (Dell, 1990)

Figs. 1, 2A–E, 3, 4, 7A–B, Table 1.

Chlanidota bisculpta Dell, 1990:185, figs. 291, 294, 295, 312.

Description.—Shell (Fig. 1) large for genus (to 14.8 mm), solid, white, elongate, with angulated shoulder. Protoconch (Fig. 7 A–B) large (diameter 1.33–1.67 mm), of about 2.25 smooth, glossy, convex, slightly flattened whorls. Protoconch diameter/protoconch height = 1.02–1.09. Transition from protoconch to teleoconch well marked by onset of axial and spiral sculpture. Teleoconch of up to 3.25 convex whorls. Suture impressed. Spiral sculpture of raised, distinct, narrow cords (12–16 on body whorl, 5–7 on penultimate whorl), half the width of intervening spaces. Axial sculpture of raised, narrow, weakly sinuate, opisthocline ribs (18–22 on first teleoconch whorl, 16–24 on subsequent whorls) that form nodules at intersections with spiral cords. Aperture large (0.51–0.65 SL), narrow, ovate, deflected from shell axis by 15–19°. Outer lip, simple, rounded anteriorly, shouldered posteriorly. Columella \approx 0.5 to 0.67 AL, weakly concave, with strong siphonal fold. Callus of thick glaze overlying parietal region, siphonal fasciole. Siphonal notch narrow, slightly dorsally recurved, with nearly straight columellar and rounded apertural margins that define borders of fasciole. Ridge margin of fasciole formed by apertural margin of siphonal notch. Shell color chalky white, aperture weakly glazed. Periostracum thin, translucent, light yellowish, thinly lallemose, with fine periostracal hairs produced at intersections of spiral threads with axial growth lines. Operculum (Fig. 1E) medium-sized (0.53 AL), elongate ovate, strongly coiled, with nucleus rotated clockwise, nearly 180° to long axis of operculum.

Anatomical data based on single immature, male specimen (Fig. 1 I, R/V *Polarstern*, Sta. 10–109), from which only a portion of the animal was recovered.

External anatomy.—(Fig. 2 A–B). Man-

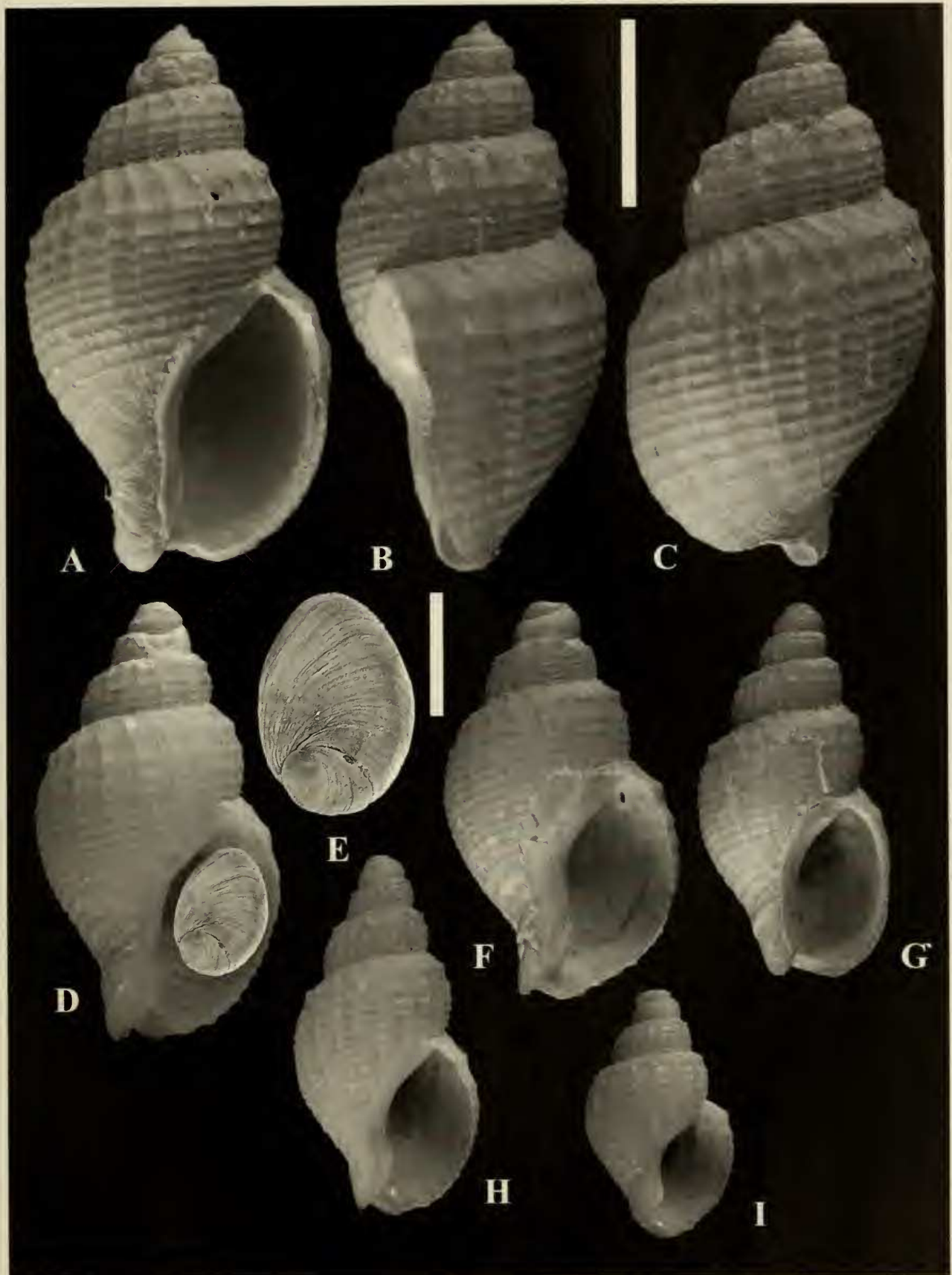


Fig. 1. *Parabuccinum bisculptum* (Dell, 1990). A–C. Holotype, USNM 860128, off Burdwood Bank, 53°08'S, 59°23'W, in 567–578 m (R/V *Eltanin*, Sta. 340). D–E. Paratype 1, USNM 860129, off Falkland (Malvinas) Islands, 51°56'S, 56°39'W, 855–866 m (R/V *Eltanin*, Sta. 557). D. Apertural view of shell. E. Operculum (coated with ammonium chloride). F. Paratype 2, USNM 860129. Same locality as paratype 1. G–I. Off Cape Horn, 55°44.0'S, 66°14.5'W, 430–397 m (R/V *Polarstern*, Sta. 40–109; G, H. ZMH, I. USNM 892150). Scale bar = 5 mm for shells, 2 mm for operculum.

tle cavity spans just over 0.5 whorl, kidney (Fig. 2A, k) $\frac{1}{3}$ whorl. Upper whorls of visceral mass unknown. Columellar muscle comprises 1.5 whorl, thick and narrow, attaching to shell at rear of mantle cavity. Foot large, oval, broader anteriorly. Body color very light yellow, nearly white, without pigmentation. Head small, tentacles (Fig. 2 A, B, ten) very long, narrow, widely separated, gradually tapering. Eyes absent. Siphon (Fig. 2 A, B, s) very long (0.75 AL), thin-walled, open.

Alimentary system.—Proboscis (Fig. 2 C–D, pr) of moderate length when contracted (0.44 SL, 0.73 AL), smooth, unpigmented. Proboscis sheath thin-walled, transparent. Mouth (Fig. 2 C, m) triangular slit. Proboscis retractors (Fig. 2 C, D, prr) broad, extremely thin, attached to middle part of rhynchodaeum on left side, to its base on right side. Buccal mass spans ≈ 0.67 proboscis length. Radular ribbon (Fig. 3) 1.55 mm long (0.39 AL), ~ 100 – $140 \mu\text{m}$ wide (~ 0.015 SL, 0.025 AL), triserial, consisting of about 60 rows of teeth. Rachidian teeth with 3 closely spaced cusps (central cusp slightly longer, wider than lateral cusps) on posterior portion of basal plate. Anterior margin of basal plate not thickened, overlaid by adjacent tooth. Lateral teeth usually with 3 cusps. Outer cusp roughly twice as long, half as wide as inner cusp. Intermediate cusp very thin, adjacent to, equal in length to inner cusp. In one specimen (Fig. 3 A–B) intermediate cusp split into two separate cusps of equal size along portion of radular ribbon. Salivary glands (Fig. 2 D, sg) small, fused, situated above nerve ring along left side of proboscis. Valve of Leiblein (Fig. 2 C, vL) well defined, although not large, pyriform. Gland of Leiblein (Fig. 2 C, D, gL) very small, short, tubular, uncoiled, whitish, opening into oesophagus without constriction, just posterior to nerve ring (Fig. 2 C, nr). Oesophagus narrow, thin-walled, broader posteriorly. Stomach (Fig. 2 E, st) broad, simple, U-shaped, without caecum. Stomach simple, broad, overlies posterior-

most oesophagus. Internal structures of stomach not well-preserved.

Male reproductive system.—Specimen immature male, with very short, dorso-ventrally flattened penis (Fig. 2B, p) lacking defined papilla.

Type locality.—Off Burdwood Bank, $53^{\circ}08'S$, $59^{\circ}23'W$, in 567–578 m (R/V *Eltanin*, Sta. 340).

Type material.—Holotype (Fig. 1 A–C), USNM 860128, from the type locality; Paratypes 1–6, USNM 860129, Paratype 7, NMNZ MF .56615, off Falkland (Malvinas) Islands, $51^{\circ}56'S$, $56^{\circ}39'W$, 855–866 m (R/V *Eltanin*, Sta. 557); Paratypes 8–9 (Paratype 9 is a specimen of *Parabuccinum rauscherti*, new species, see below), USNM 860130, Paratype 10, NMNZ MF .56616, off Cape Horn, $56^{\circ}06'S$, $66^{\circ}19'W$, 384–349 m (R/V *Eltanin*, Sta. 740).

Material examined.—Type material in USNM. 1 specimen + 1 shell, USNM 892150, 5 shells ZMH, off Cape Horn, $55^{\circ}44.0'S$, $66^{\circ}14.5'W$, 430–397 m, 16 May, 1996 (R/V *Polarstern* ANT XIII/4. Sta. 40–109).

Distribution.—Off the Falkland (Malvinas) Islands and Cape Horn at depths ranging from 349 to 866 m (Fig. 4).

Remarks.—This species most closely resembles *Parabuccinum polyspeirum* and *P. rauscherti*, new species. *Parabuccinum bisculptum* may be distinguished from *P. polyspeirum* by its slightly smaller protoconch (1.33–1.67 vs. 1.52–1.84 mm diameter), its strongly shouldered rather than rounded whorl profile, as well as by the presence of fewer, stronger spiral cords and more pronounced axial sculpture in the former (compare Tables 1, 4). Characters that may be used to differentiate *P. bisculptum* from *P. rauscherti*, new species, are discussed in the description of the new species.

Parabuccinum polyspeirum (Dell, 1990)

Figs. 4, 5, 7 E–F, Table 2.

Chlanidota polyspeira Dell, 1990:186, figs. 292, 293, 313.

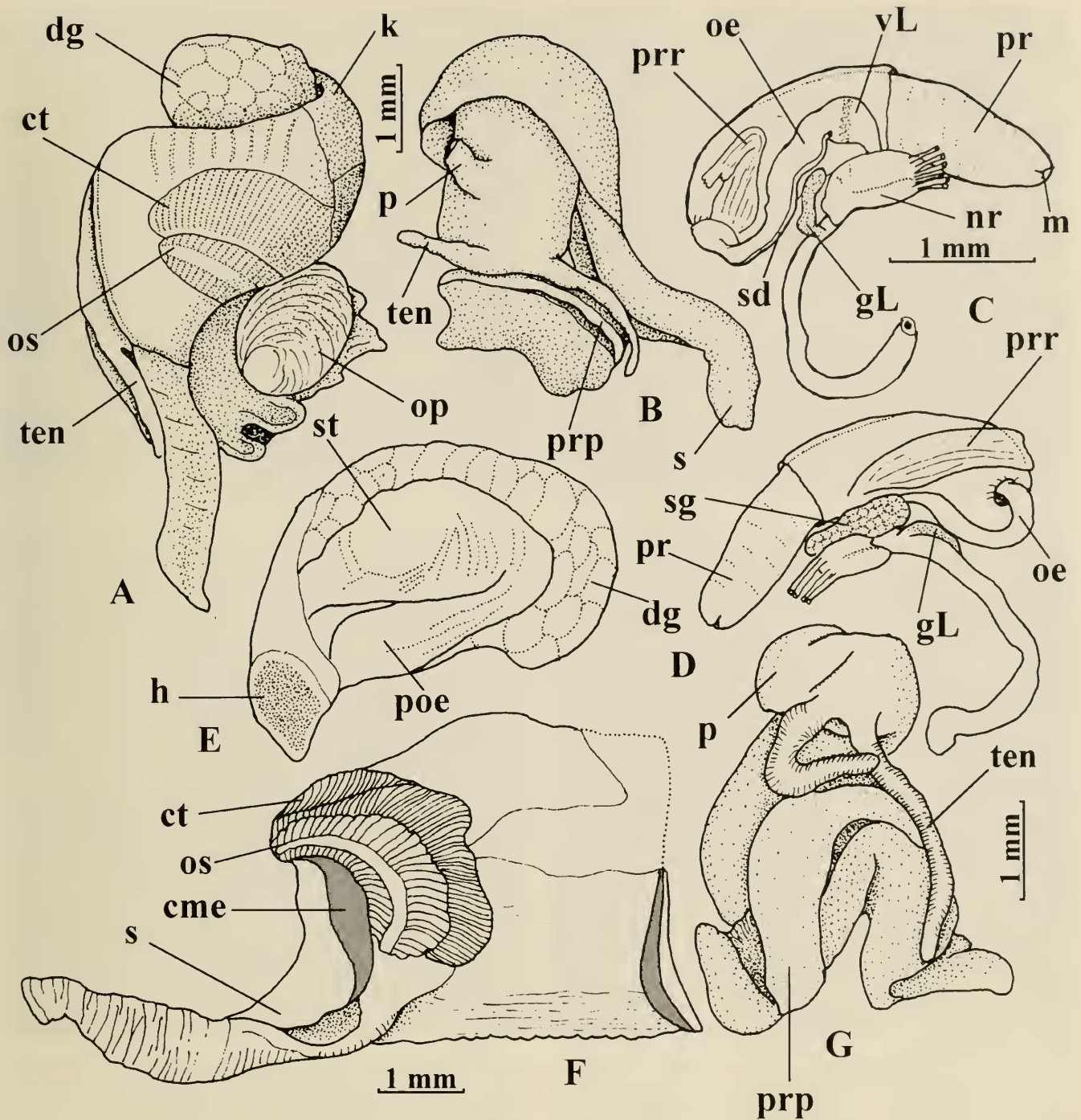


Fig. 2. Anatomy of *Parabuccinum bisculptum* (A–E, USNM 892150) and *P. rauscherti* (F–G, USNM 880616). A, B. Body removed from the shell. A. Right view. B. Anterior view of foot-head. C. Right lateral D. Left lateral, views of anterior alimentary system (salivary glands removed to show valve of Leiblein in C). E. Lateral view of stomach. F. Mantle complex of organs (partially preserved, missing part is indicated by dotted line). G. Anterior view of the body, mantle removed. Abbreviations: cme, cut mantle edge; ct, ctenidium; dg, digestive gland; gL, gland of Leiblein; h, heart; k, kidney; m, mouth; nr, circumoesophageal nerve ring; oe, oesophagus; op, operculum; os, osphradium; p, proboscis; poe, posterior oesophagus; prp, propodium; prr, proboscis retractors; s, siphon; sd, salivary duct; sg, salivary gland; st, stomach; ten, cephalic tentacles; vL, valve of Leiblein.

Description.—Shell (Fig. 5) large for genus (to 15.4 mm) solid, white, glossy, elongate, with rounded shoulder. Protoconch (Figs. 7 E–F) large (diameter 1.52–1.84 mm), consists of ≈ 2.5 smooth, glossy, con-

vex, raised whorls. Protoconch diameter/protoconch height = 1.12–1.28. Traces of weak spiral cords may be present in final 0.25 whorl of protoconch. Transition from protoconch to teleoconch abrupt, marked by

Table 1.— *Parabuccinum bisculptum* (Dell, 1990). Measurements of shell characters. Linear measurements in mm ($n = 9$, including holotype).

Character	Mean	σ	Range	Holotype
Shell Length (SL)	9.9	1.56	6.6–14.8	14.8
Body Whorl Length (BWL)	7.6	1.33	5.0–11.6	11.6
Aperture Length (AL)	5.6	1.08	4.0–8.9	8.9
Shell Width (SW)	5.4	0.83	3.9–8.2	8.2
Protoconch diameter	1.53	0.12	1.33–1.67	1.53
BWL/SL	0.76	0.03	0.74–0.81	0.78
AL/SL	0.56	0.05	0.51–0.65	0.60
SW/SL	0.54	0.03	0.51–0.59	0.55
Number of axial ribs on 1st teleoconch whorl	19.5	1.52	18–22	—
Number of axial ribs on 2nd teleoconch whorl	19.7	2.53	16–24	19
Number of axial ribs on body whorl	20.4	3.26	16–24	23
Number of spiral cords on body whorl	13.7	1.27	12–16	13
Number of spiral cords on penultimate whorl	6	0.53	5–7	6

onset of pronounced spiral cords, followed within 0.5 whorl by first, weak axial ribs. Teleoconch of up to 3.25 convex whorls. Suture impressed. Spiral sculpture of numerous (19–26 on body whorl, 8–14 on penultimate whorl) closely-spaced, raised cords. Axial sculpture of raised, narrow, sinuate, weakly prosocline ribs (16–18 on first teleoconch whorl, increasing to 19–21 on body whorl) that form faintly cancellate sculpture at intersection with spiral cords. Aperture large (0.53–0.63 SL), narrow, ovate, deflected from shell axis by 13–17°. Outer lip thin, evenly rounded. Columella ≈ 0.5 AL, weakly concave, with strong siphonal fold. Callus of thin glaze (very thin in smaller specimens) overlying parietal region, siphonal fasciole. Siphonal notch narrow, slightly dorsally recurved, with nearly straight columellar and rounded apertural margins that form borders of fasciole. Apertural margin of siphonal notch demarcates ridge margin of fasciole. Shell color chalky white, aperture weakly glazed. Periostracum very thin, smooth, translucent, tightly adherent to shell surface. Operculum unknown.

Type locality.—Patagonian Shelf, NE of

Islas de los Estados (Staten Island), 54°04'S, 63°35'W, in 247–293 m (R/V *Eltanin*, Sta. 369).

Type material.—Holotype (Figs. 5, A–C), USNM 860131, 3 paratypes, USNM 860132, 1 paratype NMNZ MF.56617, all from the type locality.

Material examined.—Type material in USNM.

Distribution.—Known only from the type locality (Fig. 4).

Remarks.—The species is known from five shells. Dell (1990) regarded this taxon to be very similar to *P. bisculptum*, but distinguished it on the basis of its narrower shell, larger protoconch, more numerous spiral cords and axial sculpture that is weaker, and becomes obsolete on the anteriormost part of the body whorl.

Parabuccinum polyspeirum is known from a single station that represents the shallowest record for any species of *Parabuccinum*.

Parabuccinum eltanini (Dell, 1990)
Figs. 6, 8, 12, Table 3.

Chlanidota eltanini Dell, 1990:184–5, figs. 290, 292, 297, 314.

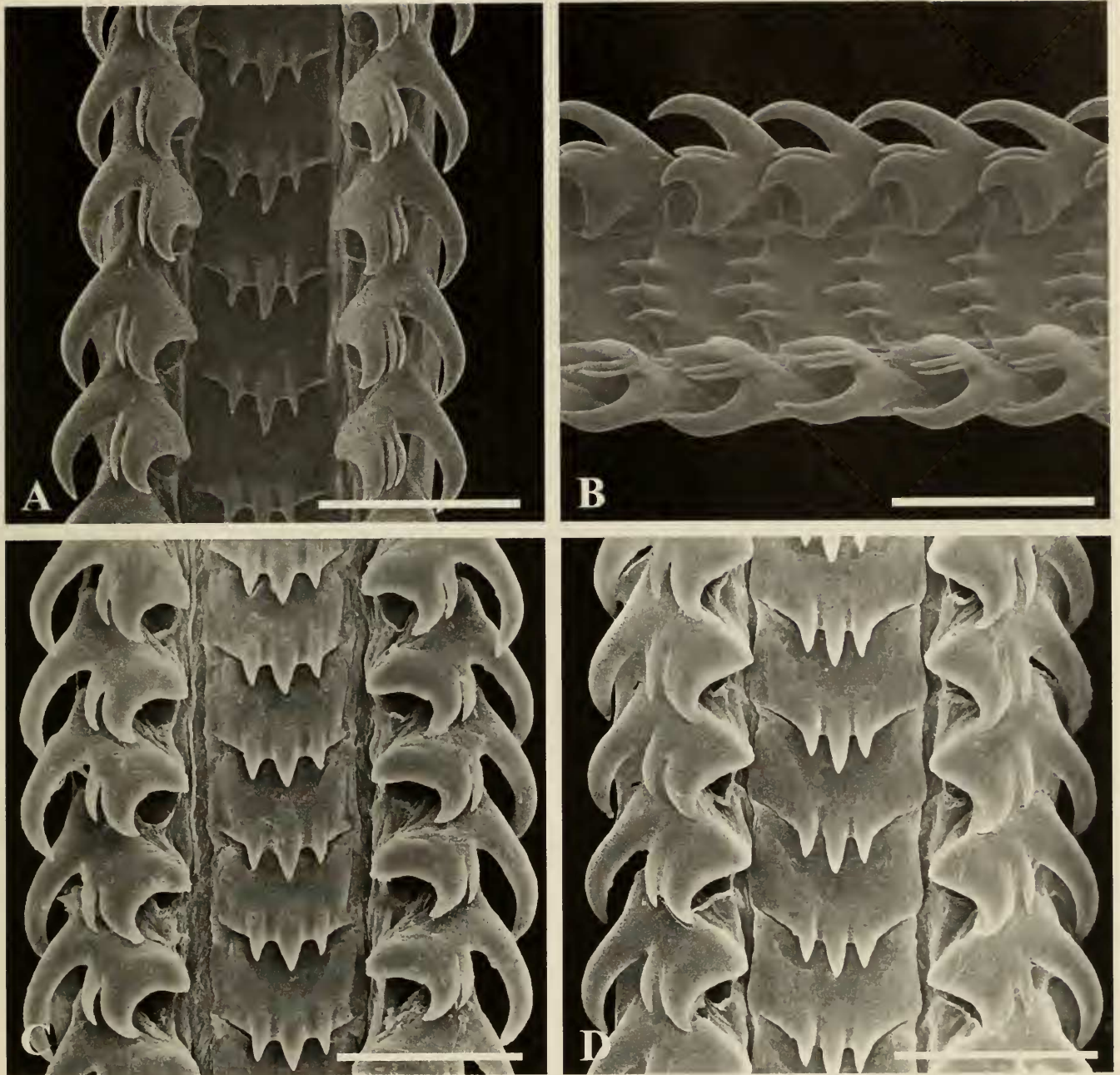


Fig. 3. Radulae of *Parabuccinum bisculptum* (Dell, 1990). A. Dorsal, and B. right lateral (45°) views of the central portion of the radular ribbon taken from animal in Fig. 11 (USNM 892150). C, D. Dorsal views of the radulae of two specimens from R/V *Polarstern*, Sta. 40–109. Scale bars = 50 μ m.

Description.—Shell (Fig. 6) largest of genus (to 16.4 mm), solid, white, ovate, with lower spire, rounded shoulder. Protoconch (Fig. 8) very large (diameter 2.06–2.94 mm), dome-shaped, of about ≈ 2.25 smooth, low, whorls. Protoconch diameter/protoconch height = 1.30–1.52. Border between protoconch and teleoconch whorls well demarcated, protoconch well preserved, teleoconch eroded. Teleoconch of up to 2.75 broadly convex whorls. Suture deeply impressed, with narrow, nearly flat-

tened rim. Spiral sculpture of numerous (32–53 on body whorl, 17–24 on penultimate whorl), adjacent, very low, fine, narrow, sometimes sinuous threads, covering entire shell surface. Axial sculpture limited to fine prosocline growth lines. Aperture large (0.65 SL), ovate to broadly ovate, deflected from shell axis by 10–14°. Outer lip simple, evenly rounded. Columella <0.5 AL, weakly concave, with broad siphonal fold. Callus consisting of thick glaze narrowly overlying parietal region, siphonal

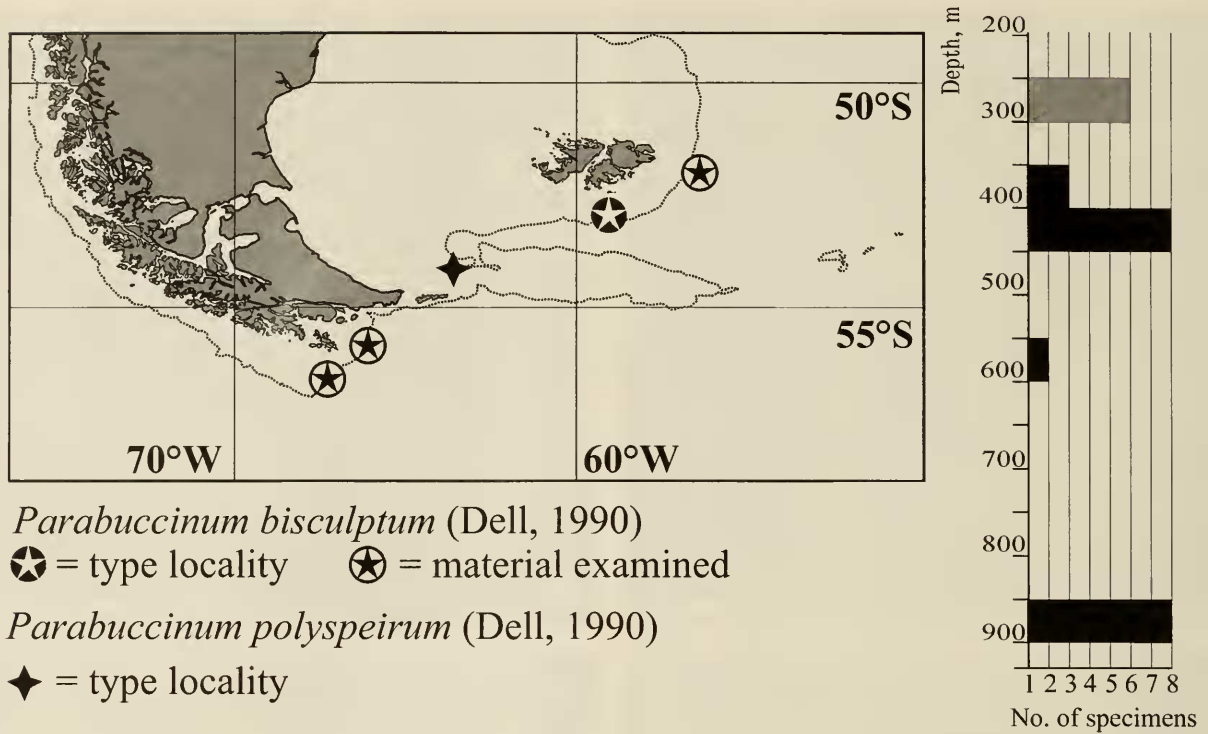


Fig. 4. Geographical distribution and bathymetric ranges of *Parabuccinum bisculptum* (Dell, 1990) and *Parabuccinum polyspeirum* (Dell, 1990). Dashed line indicate 500 m isobath. The bathymetric range of *P. bisculptum* is shown in black, that of *P. polyspeirum* in gray.

fasciole. Siphonal notch narrow, shallow, slightly dorsally recurved, its margins defining weak fasciole. Ridge margin of fasciole runs from apertural margin of siphonal notch. Shell color chalky white, aperture glazed. Periostracum thin, yellowish, tightly adhering to the shell surface, bearing irregularly spaced very short hairs. Operculum (Fig. 6H) large (0.60 AL), broadly ovate,

strongly coiled, with nucleus rotated clockwise, nearly 180° to long axis of operculum. Radula illustrated by Dell (1990:fig. 297).

Type locality.—East of Falkland (Malvinas) Islands, 51°58'S, 56°38'W, in 845–646 m (R/V *Eltanin*, Sta. 558).

Type material.—Holotype (Fig. 6, A–C), USNM 860124, paratypes 1–2, USNM 860125, paratype 3, NMNZ MF56613,

Table 2.—*Parabuccinum polyspeirum* (Dell, 1990). Measurements of shell characters. Linear measurements in mm.

Character	Holotype	Paratype 1	Paratype 2	Paratype 3
Shell Length (SL)	13.2	15.4	9.1	8.1
Body Whorl Length (BWL)	10.3	11.5	7.3	6.4
Aperture Length (AL)	7.2	8.2	5.7	5.0
Shell Width (SW)	6.9	7.7	4.8	4.7
Protoconch diameter	1.84	1.84	1.75	1.52
BWL/SL	0.78	0.75	0.80	0.79
AL/SL	0.55	0.53	0.63	0.62
SW/SL	0.52	0.50	0.53	0.58
Number of axial ribs on 1st teleoconch whorl	16	16	17	18
Number of axial ribs on 2nd teleoconch whorl	22	18	24	21
Number of axial ribs on body whorl	21	20	19	19
Number of spiral cords on body whorl	26	24	22	19
Number of spiral cords on penultimate whorl	14	11	8	8

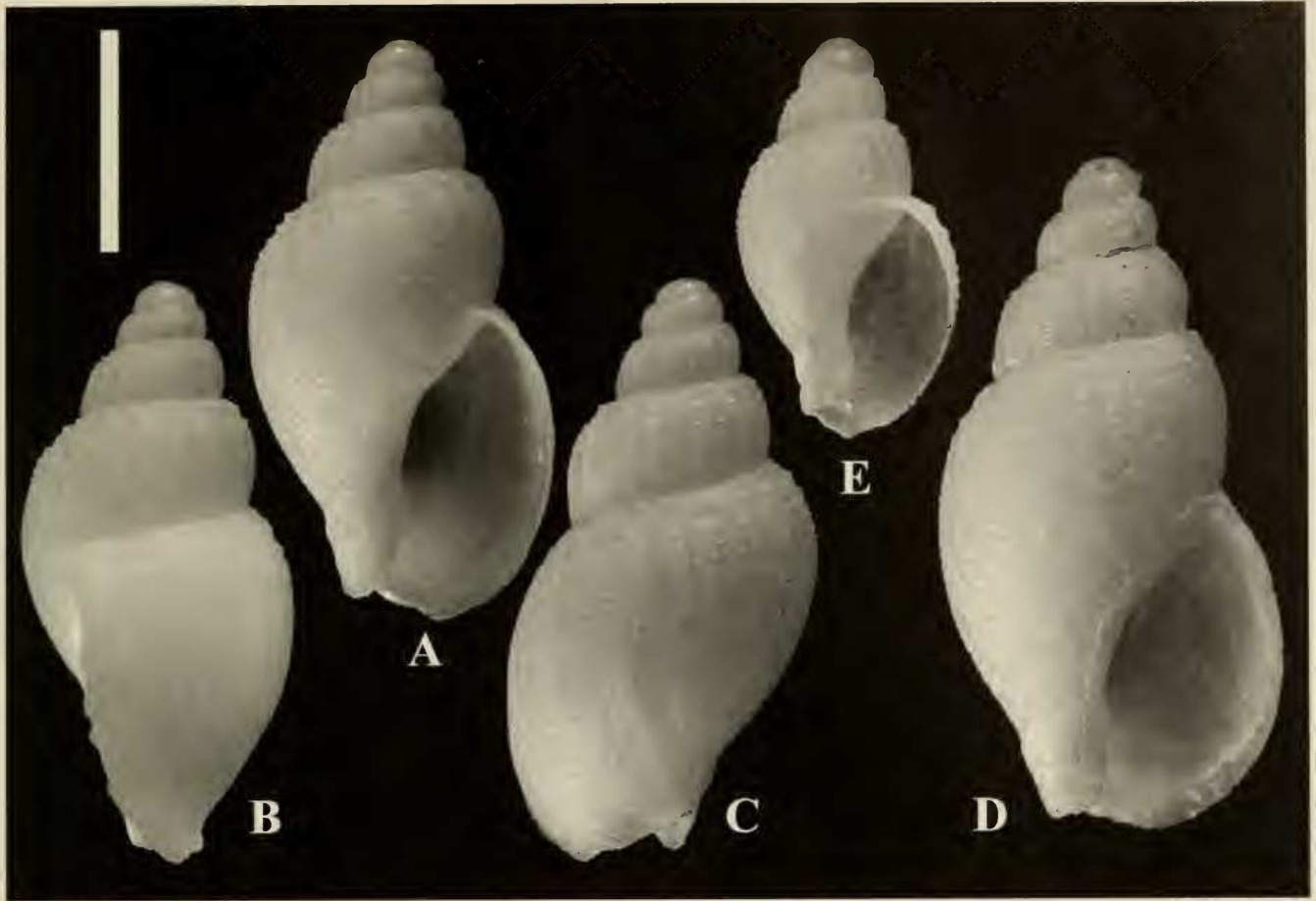


Fig. 5. *Parabuccinum polyspeirum* (Dell, 1990). A–C. Holotype, USNM 860131, R/V *Eltanin*, Sta. 369, Patagonian Shelf, NE of Islas de los Estados (Staten Island), 54°04'S, 63°35'W, in 247–293 m D. Paratype 1. E. Paratype 2. Both from type locality. Scale bar = 5 mm.

from the type locality. Paratypes 4–5 [paratype 5 (SL 4.8 mm) is not a buccinoidean, but belongs in the family Cancellariidae (Admetinae)] USNM 860126, E off Falkland (Malvinas) Islands, 51°56'S, 56°39'W, 855–866 m (R/V *Eltanin*, Sta. 557). Para-

types 6–7, USNM 860127, paratype 8, NMNZ MF.56614, E off Falkland (Malvinas) Islands, 54°09'S, 52°08'W, 419–483 m (R/V *Eltanin*, Sta. 1521).

Material examined.—Type material in USNM.

Table 3.—*Parabuccinum eltanini* (Dell, 1990). Measurements of shell characters of intact specimens. Linear measurements in mm. * = heavily eroded.

Character	Holotype USNM 860124	Paratype USNM 860127	Paratype USNM 860125
Shell Length (SL)	13.5	16.4	15.8
Body Whorl Length (BWL)	11.3	13.6	13.0
Aperture Length (AL)	8.8	10.3	9.9
Shell Width (SW)	8.8	10.0	9.6
Protoconch diameter	2.06*	2.94	2.24*
BWL/SL	0.84	0.83	0.80
AL/SL	0.65	0.63	0.63
SW/SL	0.65	0.61	0.61
Number of spiral cords on body whorl	37	53	38
Number of spiral cords on penultimate whorl	17	24	20

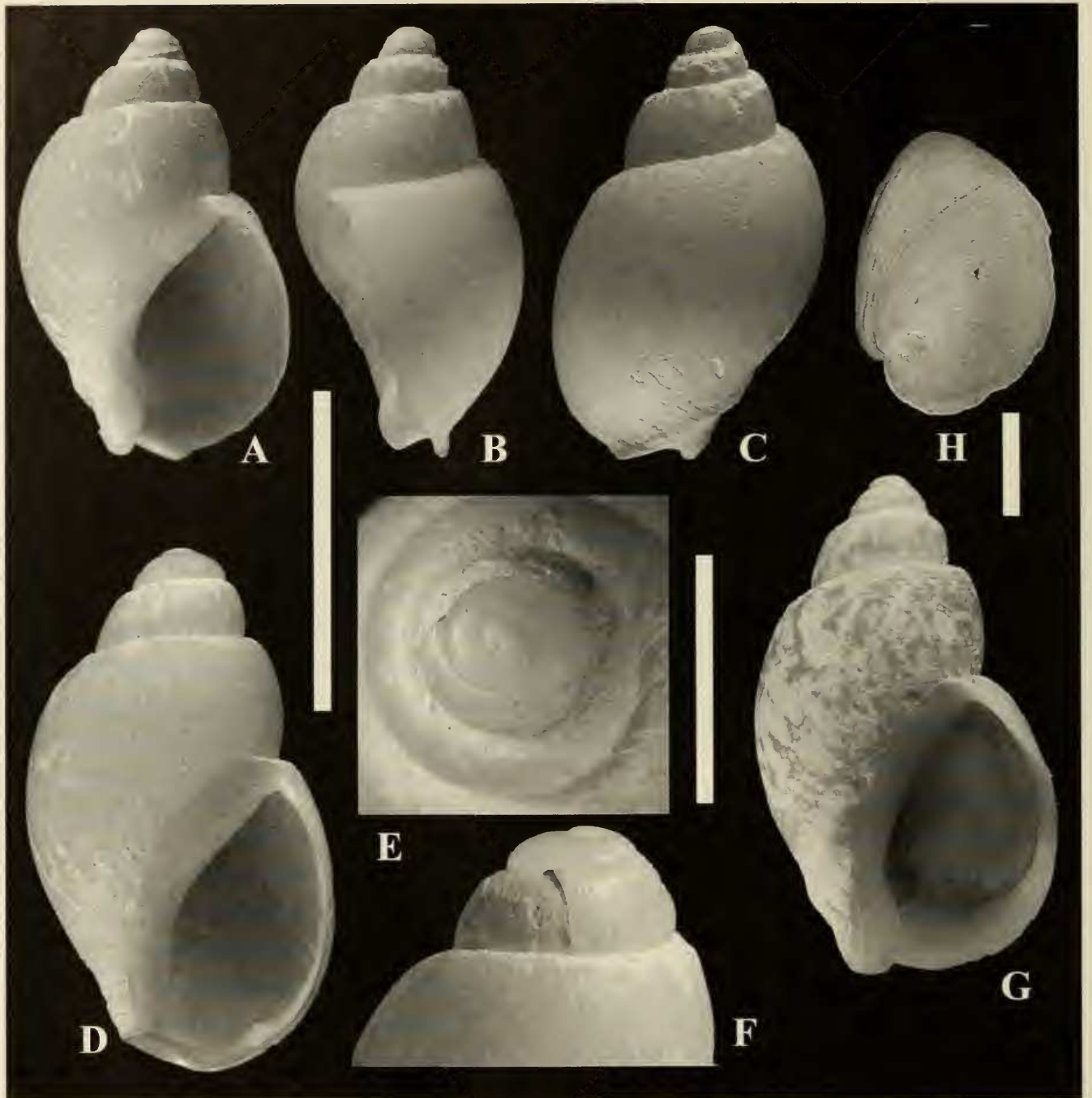


Fig. 6. *Parabuccinum eltanini* (Dell, 1990). A–C. Holotype, USNM 860124. D–F. Paratype, USNM 860127, E of Falkland (Malvinas) Islands, 54°09'S, 52°08'W, 419–483 m (R/V *Eltanin*, Sta. 1521). D. Apertural view. E. Dorsal view of the protoconch. F. Lateral view of the protoconch showing transition between protoconch and teleoconch whorls. G–H. Paratype, USNM 860125, type locality, E off Falkland (Malvinas) Islands, 51°58'S, 56°38'W, 845–646 m (R/V *Eltanin*, Sta. 558). G. Apertural view. H. Operculum (coated with ammonium chloride). Scale bars = 1 cm for shells, 5 mm for protoconch, 2 mm for operculum.

Distribution.—Off Falkland (Malvinas) Islands. Specimens collected at depths from 419 to 866 m. (Fig. 12).

Remarks.—This species differs from all congeners in having a smoothly ovate shell with a tall body whorl, a strongly prosocline outer lip, an extremely large, dome-shaped protoconch, and by the absence of

axial sculpture. Dell's (1990:fig. 297) line drawing of the radula of *P. eltanini* shows a lateral tooth with a narrow basal plate and inner cusp, which differs from those of other *Parabuccinum* (Figs. 3, 10) and somewhat resembles those of *Chlanidota* (see, eg., Harasewych & Kantor, 1999 figs. 10 A, C). Although we were unable to study the

anatomy of *P. eltanini*, we assign it to the genus *Parabuccinum* on the basis of the morphology of its shell, especially the characteristic protoconch, and operculum.

Paratype 5, the smaller (SL = 4.8 mm) of the two paratypes from R/V *Eltanin* station 557 (USNM 860126), is not conspecific with the rest of the type series, but is a species referable to the cancellariid subfamily Admetinae.

Parabuccinum rauscherti, new species

Figs. 2F–G, 7C–D, 9–12, Table 4.

Chlanidota bisculpta Dell, 1990 (partim):185.

Description.—Shell (Fig. 9) small for genus (to 10.2 mm), solid, white, broadly ovate to elongate, with flattened, shallow subsutural rim, pronounced, rounded to angulated shoulder. Protoconch (Fig. 7 C–D) small (diameter 1.07–1.2 mm), of about 1.75 glossy, convex, inflated whorls. Protoconch diameter/protoconch height = 1.10–1.31. Transition from protoconch to teleoconch well marked by onset of spiral followed immediately by axial sculpture. First teleoconch whorl thinner than protoconch. Teleoconch of up to 3.25 convex whorls. Suture strongly impressed. Spiral sculpture of closely spaced cords varying in strength from strongly pronounced to nearly smooth (16–40 on body whorl, 10–16 on penultimate whorl), generally broader than intervening spaces. Axial sculpture of strong, broad, slightly sinuous, orthocline ribs (13–17 on first teleoconch whorl, 15–20 on subsequent whorls). Nodules formed at intersections with spiral cords evident in early whorls, abraded on body whorl. Aperture large (0.51–0.65 SL), narrow to moderately ovate, deflected from shell axis by 12–15°. Outer lip evenly rounded, usually slightly thickened. Columella <0.5 AL, weakly concave, with strong, sharply deflected siphonal fold. Callus of thin to thick glaze narrowly overlying parietal region and siphonal fasciole. Siphonal notch moderately broad, very slightly dorsally re-

curved, with straight columellar, rounded apertural margins defining borders of fasciole. Ridge margin of fasciole formed by apertural margin of siphonal notch. Shell color chalky white, aperture weakly glazed. Periostracum very thin, tightly adherent, yellowish, weakly hirsute. Operculum (Fig. 9D, G) medium-sized (0.49–0.53 AL), elongate ovate, strongly coiled, with nucleus rotated clockwise, nearly 180° to long axis of operculum.

Anatomical data based on single, poorly preserved male specimen (Fig. 9 E–F, Paratype 1) from which only a portion of the animal was recovered.

External anatomy.—(Fig. 2F–G). Foot long (L/W ~2.5), oval, broad anteriorly, tapering posteriorly, with thickened propodium. Body color uniformly yellowish-white. Head small short, tentacles (Fig. 3G, ten) long, left longer than right, tapering distally. Eyes absent. Mantle cavity (Fig. 3F) as wide as long. Mantle edge thickened, with scalloped edge. Siphon (Fig. 3F) very long (0.9 AL), thin walled, wide. Osphradium ≈0.67 mantle length, wide, with curved axis. Ctenidium slighter longer, 0.67 as wide as osphradium, spans about 0.75 of mantle length, formed of tall triangular lamellae that become narrower toward mantle edge.

Alimentary system.—Proboscis of moderate length in contracted position (0.35 SL, 0.6 AL), smooth, unpigmented. Proboscis sheath very thin-walled, transparent. Mouth opening triangular. Proboscis retractors broad, extremely thin, asymmetrically attached to proboscis sheath. Buccal mass occupies ≈0.63 length of retracted proboscis. Radula (Fig. 10) 1.54 mm long (0.33 AL), ~120–140 μm wide (~0.015–0.017 SL, 0.026–0.030 AL), of 65 rows of teeth, posteriormost 3 nascent. Rachidian teeth tricuspid (central cusp slightly longer, as wide as lateral cusps). Lateral teeth usually with 3 cusps. Outer cusp nearly twice as long, half as wide as inner cusp. Intermediate cusp thin, equal in length to inner cusp. In one specimen (Fig. 10 C) intermediate cusp

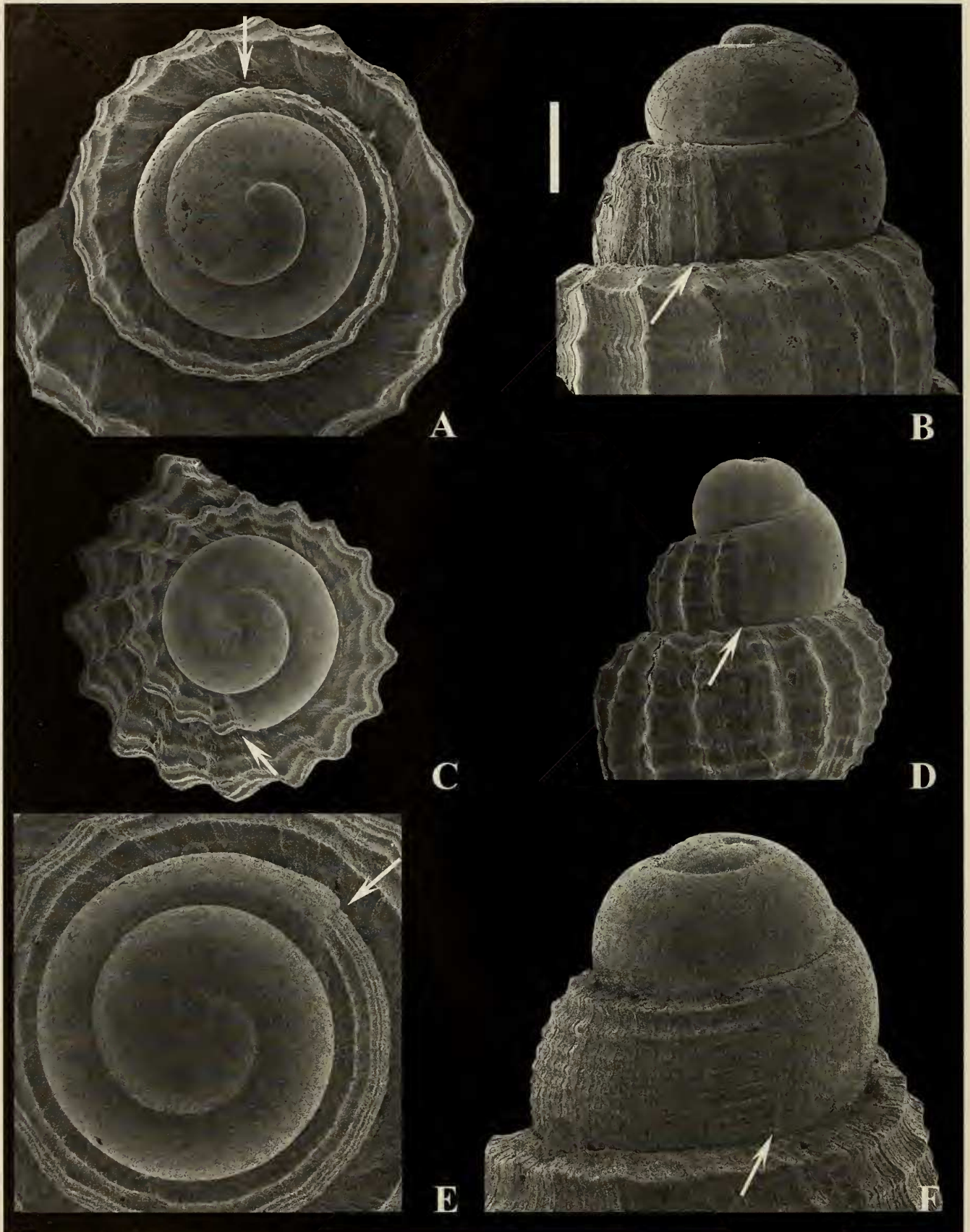


Fig. 7. Protoconchs of *Parabuccinum*. A–B. *P. bisculptum* (Dell, 1990), ZMH. C–D. *P. rauscherti*, new species. Paratype, ZMH 2813. E–F. *P. polyspeirum* (Dell, 1990) Paratype in fig. 5 E. Arrows indicate transition from protoconch to teleconch. Scale bar = 500 μ m for all figures.

Table 4.—*Parabuccinum rauscherti*, new species. Measurements of shell characters. Linear measurements in mm ($n = 12$, including types).

Character	Mean	σ	Range	Holotype	Paratype 1	Paratype 4
Shell Length (SL)	8.4	0.67	7.6–9.6	7.7	8.1	8.1
Body Whorl Length (BWL)	6.5	0.63	5.4–7.4	6.1	6.3	6.2
Aperture Length (AL)	4.7	0.49	4.2–5.5	4.2	4.7	4.6
Shell Width (SW)	5.0	0.44	4.1–5.8	4.6	4.7	4.9
Protoconch diameter	1.15	0.05	1.07–1.20	1.07	1.18	1.13
BWL/SL	0.76	0.03	0.71–0.80	0.79	0.78	0.77
AL/SL	0.56	0.05	0.51–0.65	0.55	0.58	0.57
SW/SL	0.60	0.04	0.54–0.67	0.59	0.58	0.60
Number of axial ribs on 1st teleoconch whorl	15.0	1.15	13–17	13	15	14
Number of axial ribs on 2nd teleoconch whorl	16.5	1.76	15–20	16	17	16
Number of axial ribs on body whorl	17.7	1.95	15–20	16	17	17
Number of spiral cords on body whorl	25.8	6.88	16–40	25	17	20
Number of spiral cords on penultimate whorl	12.1	2.28	10–16	12	10	10

fused with inner cusp along portion of radial ribbon. Valve of Leiblein well defined, medium-sized, pyriform. Salivary ducts join oesophagus just anterior to the valve. Remainder of alimentary system poorly preserved.

Male reproductive system.—Specimen mature male, with long, broad penis (Fig. 11) extending length of mantle length. Distal end of penis transversely flattened, bordered by thickened edge. Penial papilla (Fig. 11B, pap) long, cylindrical, surrounded by narrow circular fold at the base.

Type locality.—Off Cape Horn, 55°44.0'S, 66°14.5'W, in 430–397 m. (R/V *Polarstern*, ANT XIII/4. Sta. 40–109).

Type material.—Holotype (ZMH 2811), paratypes 1–3 (USNM 880616), paratype 4 (ZMH 2812), paratypes 5–20 (ZMH 2813), paratypes 21–30 (ZMH 28134), from the type locality.

Material examined.—Type material. R/V *Eltanin*. Sta. 339: Falkland (Malvinas) Islands, Beauchene Island, 53°05'S, 59°31'W, 512–586 m, 1 shell, USNM 870141; Sta. 740, off Cape Horn, 56°06'S, 66°19'W,

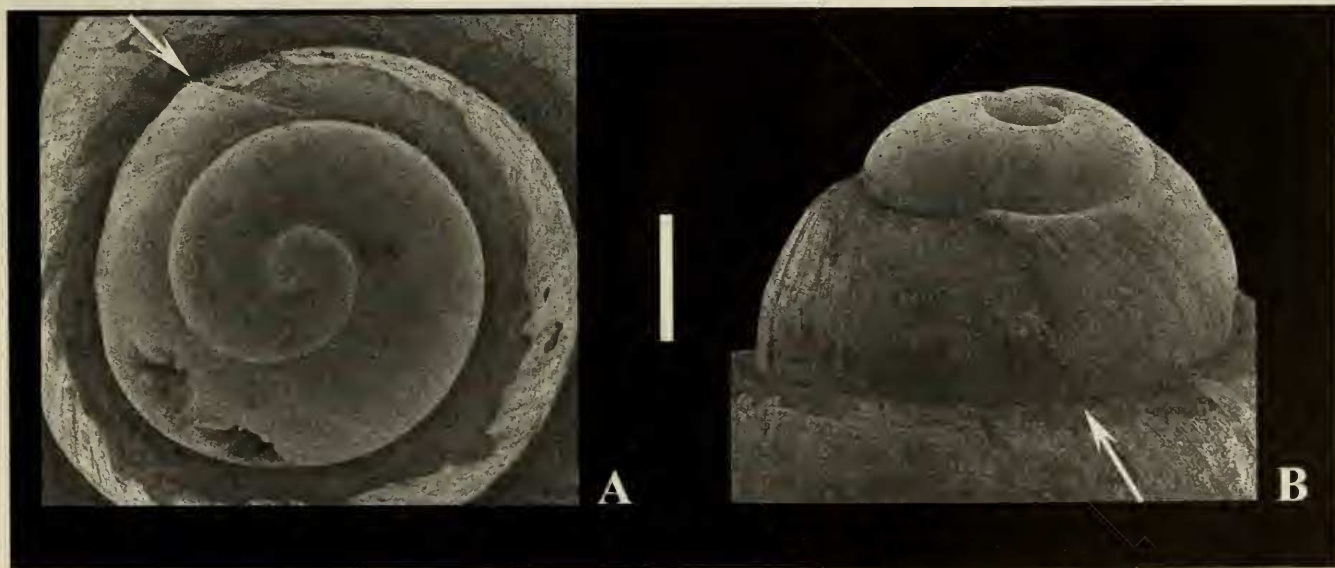


Fig. 8. Protoconch of *Parabuccinum eltanini* (Dell, 1990) at half the magnification of figure 7. Paratype, USNM 860127, E of Falkland (Malvinas) Islands, 54°09'S, 52°08'W, 419–483 m (R/V *Eltanin*, Sta. 1521). See also Fig. 6 E–F. Arrows indicate transition from protoconch to teleoconch. Scale bar = 1 mm.

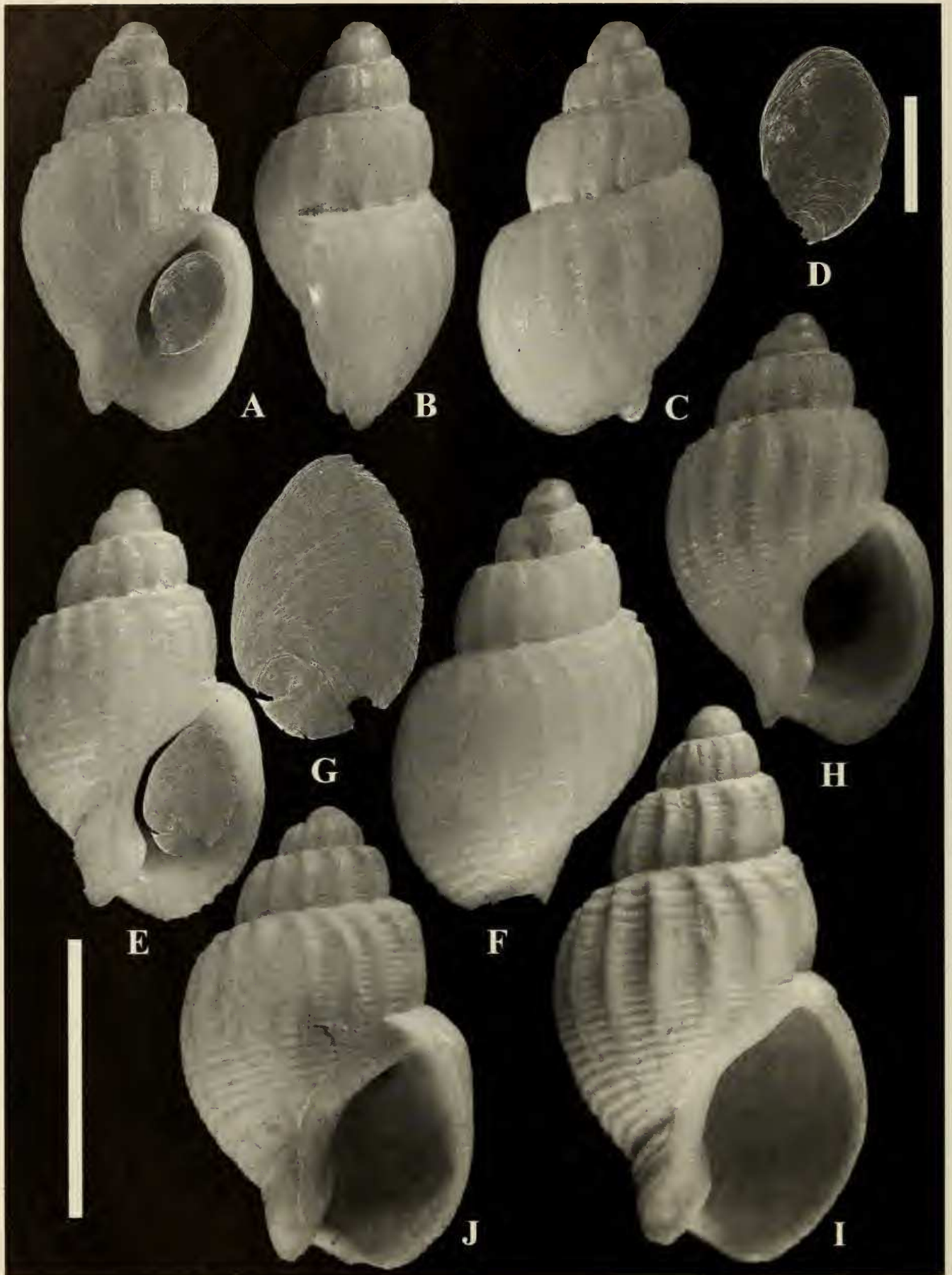


Fig. 9. *Parabuccinum rauscherti*, new species. A-D. Holotype, ZMH 2811, R/V *Polarstern* ANT XIII/4, Sta. 40-109, off Cape Horn, 55°44.0'S, 66°14.5'W, in 430-397 m. A-C. Shell. D. Operculum. E-G. Paratype 1, type locality, USNM 880616. E-F. Shell. G. Operculum. H. Paratype 4, ZMH 2812, type locality. I-J. R/V *Polarstern* Sta. 40-114, off Cape Horn, 55°31.6'S, 65°56.8'W, 2165-2008 m, ZMH. Scale bar = 5 mm for shells, 2 mm for operculum.

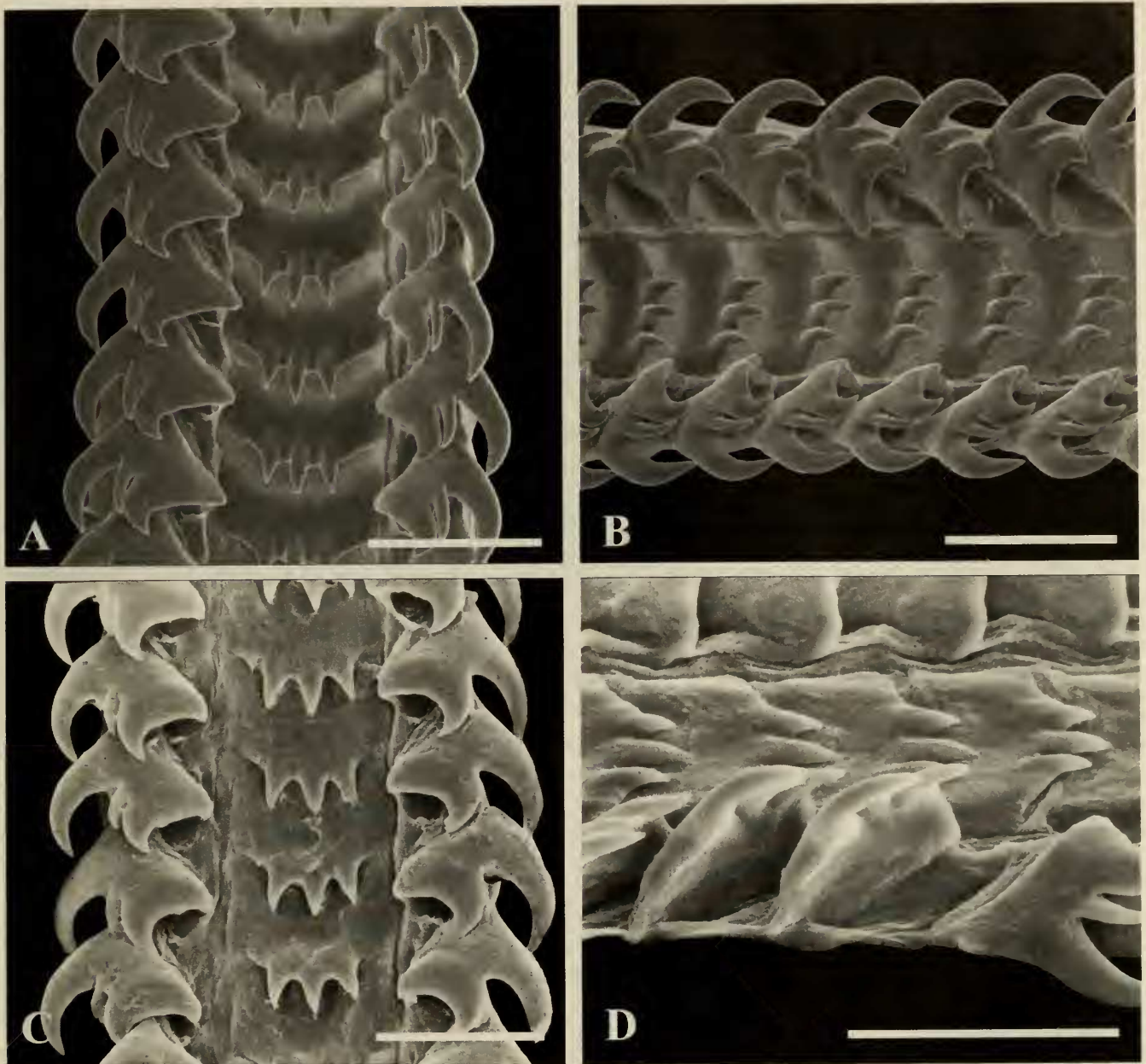


Fig. 10. Radula of *Parabuccinum rauscherti*, new species. A. Dorsal, and B. left lateral (45°) views of the central portion of the radular ribbon taken from paratype 1, USNM 880616 (Figs. 9, E–F). C. Dorsal and D. left lateral (45°) views of the central portion of the radular ribbon taken from paratype 4, ZMH 2812 (Figs. 9 G). Scale bars = 50 μ m.

384–349 m, 1 shell (paratype of *Chlanidota bisculpta*), USNM 860130. R/V *Polarstern* ANT XIII/4: Sta. 40–114, off Cape Horn, 55°31.6'S, 65°56.8'W, 2165–2008 m, 18 May, 1996, ZMH, 29 shells. R/V *Vidal Gomaz*: Sta. 42, Canal Concepcion, 50°35.7'S, 75°04.5'W, 250 m, 25 Oct 1996, ZMH, 5 specimens.

Distribution.—Off the Falkland (Malvinas) Islands, Cape Horn and northward along western coast of Chile to Canal Concepcion. Shells were trawled at depths ranging

from 349 to 2165 m. Live animals were collected from 349 to 532 m (Fig. 12).

Etymology.—This new species is named after Martin Rauschert who developed the small dredge used to collect this species. Dr. Rauschert is an amphipod taxonomist who has worked for several years in the Antarctic and Magellanic regions.

Remarks.—*Parabuccinum rauscherti* is most similar in shell sculpture structure to *P. bisculptum* from which it differs in having a smaller, slightly broader shell (SW/SL

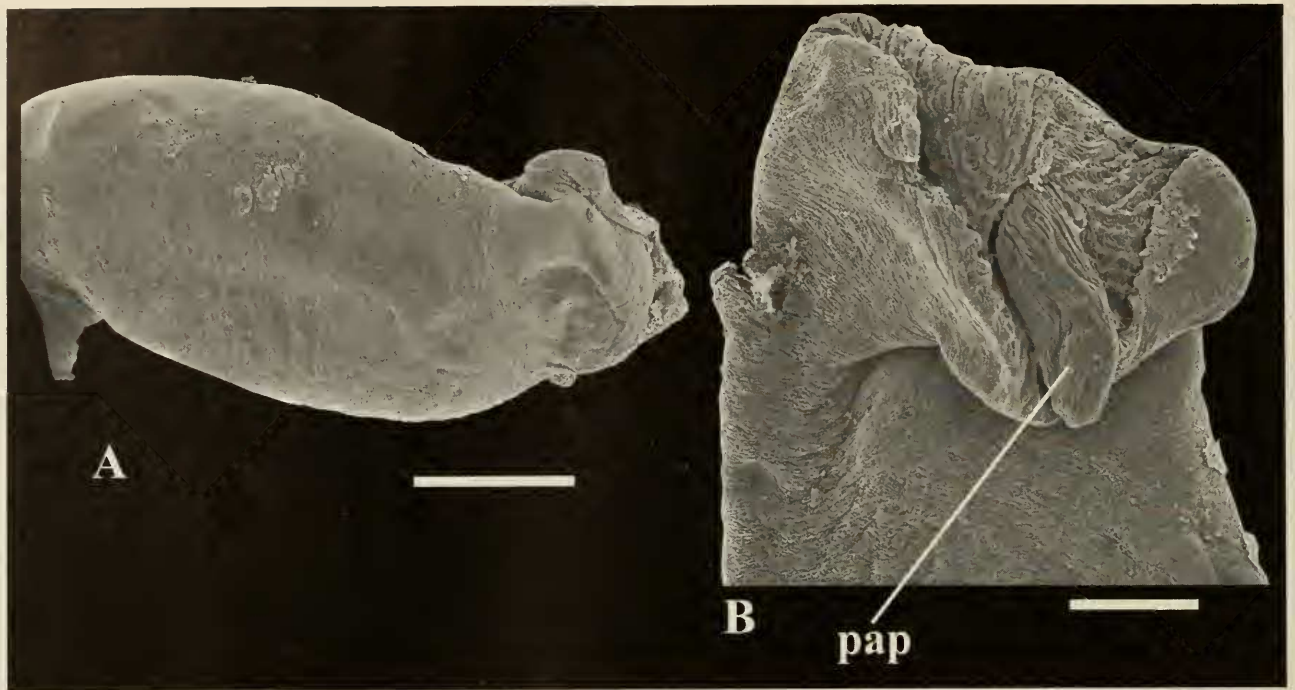


Fig. 11. *Parabuccinum rauscherti*, new species. Critical point dried penis of paratype 1, USNM 880616 (Figs. 9, E–F). A. Dorsal surface. Scale bar = 500 μ m. B. Distal tip showing papilla. Scale bar = 200 μ m.

≈ 0.60 in *P. rauscherti*, 0.54 in *P. biscalptum*), a smaller protoconch (average diameter = 1.16 mm in *P. rauscherti*, 1.53 in *P. biscalptum*) (compare Fig. 7A, B and 7C, D). *Parabuccinum rauscherti* also has more numerous and closely spaced spiral cords

(average = 25.9 on body whorl, 12.1 on penultimate whorl) than *P. biscalptum* (average = 13.8 on body whorl, 6.0 on penultimate whorl) and less numerous (16.5 vs. 19.8) but wider axial ribs. *Parabuccinum rauscherti* and *P. biscalptum* were taken to-

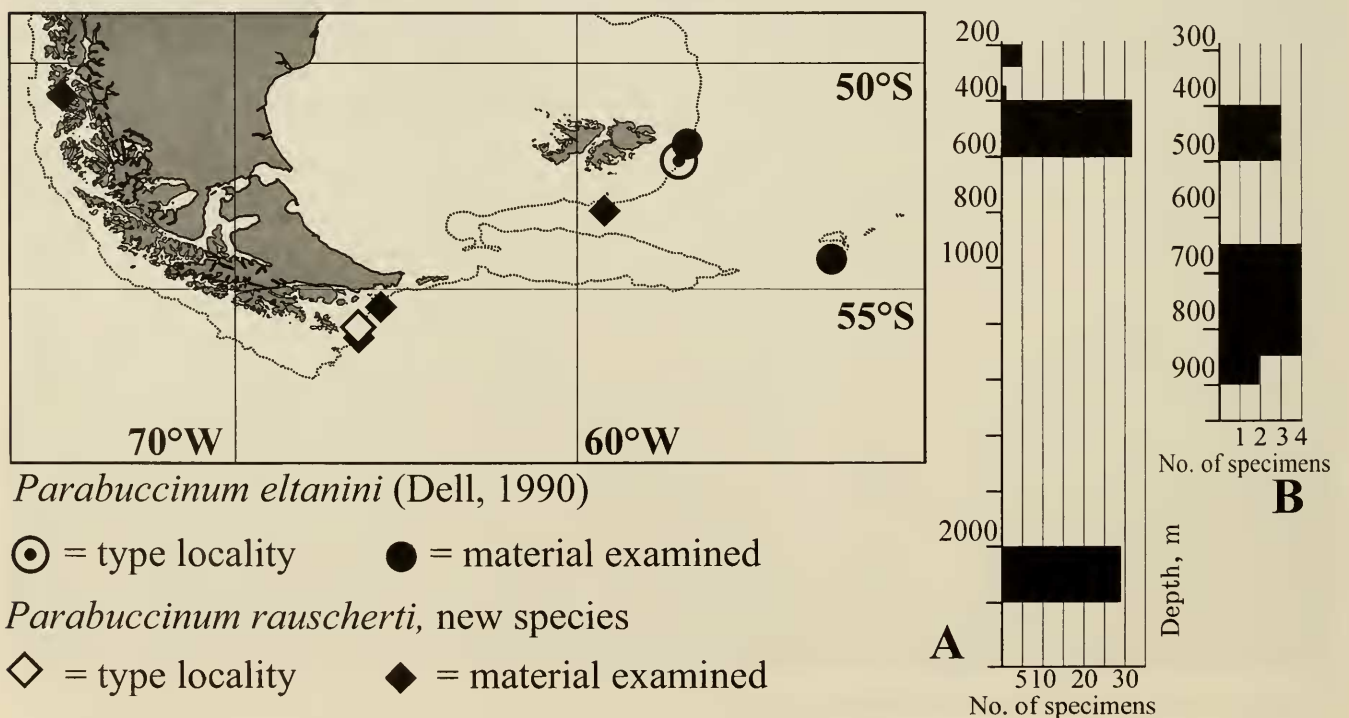


Fig. 12. Geographical distribution and bathymetric ranges of *Parabuccinum eltanini* (Dell, 1990) and *Parabuccinum rauscherti*, new species. Dashed line indicates 500 m isobath. A. Bathymetric range of *P. rauscherti*. B. Bathymetric range of *P. eltanini*.

gether at two stations off Cape Horn (R/V *Polarstern* Sta. 10–109 and R/V *Eltanin* Sta. 740).

Parabuccinum rauscherti may be most readily distinguished from either *P. polyspeirum* or *P. eltanini* by its much smaller protoconch and pronounced axial sculpture. *Parabuccinum rauscherti* exhibits some variation in shell outline and the number of spiral cords.

The smaller of the two paratypes of *Chlanidota bisculpta*, from R/V *Eltanin* Sta. 740 (USNM 860130, SL = 6.9 mm) is actually a specimen of *Parabuccinum rauscherti*.

Discussion

Despite the limited availability of the anatomical data for *Parabuccinum*, it clearly shares anatomical features with other Buccinulinae, such as *Chlanidota*, *Cavineptunea* and several yet to be named genera. These similarities include proboscis morphology, tricuspid rachidian and lateral radular teeth, a well defined valve of Leiblein, fused salivary glands, a characteristic crop-like structure of the posterior oesophagus, and a broadly U-shaped stomach, lacking a caecum (posterior mixing area). This stomach morphology was found in all antiboreal Buccinoidea studied thus far. Among northern hemisphere buccinoideans, a stomach lacking a caecum was recorded only in the northern Atlantic buccinid *Colus gracilis* (DaCosta, 1778) (see Smith 1967) and deep-water Arctic species *Mohnia (Tacita) danielsseni* (Friele, 1879) (see Lus 1981).

Parabuccinum has a number of unusual features, among them a very long mantle siphon, a very small, nearly vestigial gland of Leiblein, and characteristic penis morphology previously unrecorded in Buccinoidea.

With the exception of *Parabuccinum*, the Magellanic buccinoidean fauna is comprised of genera attributed to the buccinulid subfamily Cominellinae (e.g., *Pareuthria*, *Falsitromina*, *Parficulina*). As there are no

closely related South American or Magellanic Buccinoidea, *Parabuccinum* is likely derived from the Antarctic Buccinulinae.

Powell (1951) attributed the following Antarctic genera to the subfamily Buccinulinae: *Chlanidota*, *Pfefferia* (a subgenus of *Chlanidota*, as demonstrated by Harasewych & Kantor 1999), *Neobuccinum*, *Probuccinum*, *Cavineptunea* and *Bathynomus*.

The differences between *Parabuccinum* and *Chlanidota* have been discussed above. Of the remaining Antarctic buccinuline taxa, only one—the monotypic genus *Neobuccinum*, has a similar paucispiral operculum. The shell morphology of *Neobuccinum eatoni* (Smith, 1907) is similar to that of *Parabuccinum*, especially to that of *P. eltanini*. Both *Neobuccinum* and *Parabuccinum* have large, dome-shaped protoconchs that appear to be more resistant to erosion than their teleoconchs. The radula of *N. eatoni* (illustrated by Numanami, 1996:fig. 94C) resembles that of *P. eltanini* more than those of the other species of *Parabuccinum* in that the central cusps of the lateral teeth are larger and more distant from the inner cusps. *Parabuccinum* and *Neobuccinum* may be distinguished anatomically, particularly on the basis of penis morphology and the size and shape of gland of Leiblein. The penis of *Neobuccinum* has a broadly rounded distal end with a very small, blunt seminal papilla, while the gland of Leiblein in this species is large and well developed (unpublished observations).

Neobuccinum eatoni has a circumantarctic distribution extending along the Scotia Arc, and to Kerguelen Island, as well as a broad bathymetric range (5 to 2350 m). Despite the anatomical differences, we consider *Neobuccinum* to be the most promising candidate for sister group of *Parabuccinum* among the presently known Antarctic buccinoidean fauna. *Parabuccinum* thus represents an Antarctic component in the Magellanic malacofauna.

The distinctive paucispiral opercula of *Parabuccinum* and *Neobuccinum* differ from those of other austral Buccinoidea, yet

resemble opercula of the deep-water boreal genus *Mohnia* (termed *Mohnia* type operculum by Bouchet and Warén 1985:171). Several species of *Mohnia* also have tricuspid rachidian and lateral teeth (Bouchet & Warén 1985:178–179) while at least one species [*Mohnia (Tacita) danielsseni*, see above] has a stomach lacking a caecum. *Mohnia* is readily distinguished from *Parabuccinum* and *Neobuccinum* by numerous conchological (e.g., presence of siphonal canal) and radular (rachidian teeth with squarish basal plate and lateral cusps lost or closely juxtaposed to prominent central cusp) characters. It is, as yet, unclear whether these similarities are indicative of a close relationship between these antipodal taxa, or represent plesiomorphic characters within the Buccinoidea.

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